

CLAIMS

1. An optical pickup lens driving apparatus comprising:
an optical pickup lens;
four supporting wires which movably support a movable member;

a fixing member in which said four supporting wires are supported;

driving means which controls movement of said optical pickup lens by action of electromagnetic force;

a balance shaft in which one end of said balance shaft is connected to said movable member, a balance weight is provided at the other end, and a balancing middle portion of said balance shaft is oscillatably journaled in said fixing member,

wherein said optical pickup lens is mounted on said movable member.

2. An optical pickup lens driving apparatus according to claim 1, wherein said driving means has a permanent magnet and a driving coil which generate the electromagnetic force, said permanent magnet is provided on a fixing side, and said driving coil is provided in said movable member.

3. An optical pickup lens driving apparatus according to claim 1, wherein said driving means has the permanent magnet and the driving coil which generate the electromagnetic force, said permanent magnet is provided on a fixing side, and said driving coil is provided in said balance shaft.

4. An optical pickup lens driving apparatus according to

claim 1, further comprising;

a permanent magnet which is provided in said balance weight of said balance shaft, and

fine adjustment means which is provided opposite to said permanent magnet, said fine adjustment means controlling the movement of said optical pickup lens in focusing, tracking, tilt, and yawing directions.

5. An optical pickup lens driving apparatus according to claim 1, wherein said balance shaft is oscillatably journaled in said fixing member by a gimbal mechanism.

6. An optical pickup lens driving apparatus according to claim 1, wherein one side of said balance shaft is supported by said movable member via a bearing.

7. An optical pickup lens driving apparatus according to claim 6, wherein an oscillation of said movable member can be performed in such a manner that said movable member is restricted movement thereof around said balance shaft by said bearing.

8. An optical pickup lens driving apparatus comprising:
an optical pickup lens;

four supporting wires which movably support a movable member;

a fixing member in which said four supporting wires are supported;

driving means which controls movement of said optical pickup lens by action of electromagnetic force;

a balance shaft in which one end of said balance shaft is connected to said movable member, a balance weight is provided at the other end, and a balancing middle portion of said balance shaft is oscillatably journaled in said fixing member,

wherein said optical pickup lens is mounted on said balance shaft.

9. An optical pickup lens driving apparatus according to claim 8, wherein said driving means has a permanent magnet and a driving coil which generate the electromagnetic force, said permanent magnet is provided on a fixing side, and said driving coil is provided in said movable member.

10. An optical pickup lens driving apparatus according to claim 8, wherein said driving means has the permanent magnet and the driving coil which generate the electromagnetic force, said permanent magnet is provided on a fixing side, and said driving coil is provided in said balance shaft.

11. An optical pickup lens driving apparatus according to claim 8, further comprising;

a permanent magnet which is provided in said balance weight of said balance shaft, and

fine adjustment means which is provided opposite to said permanent magnet, said fine adjustment means controlling the movement of said optical pickup lens in focusing, tracking, tilt, and yawing directions.

12. An optical pickup lens driving apparatus according to

claim 8, wherein said balance shaft is oscillatably journaled in said fixing member by a gimbal mechanism

13. An optical pickup lens driving apparatus according to claim 8, wherein one side of said balance shaft is supported by said movable member via a bearing.

14. An optical pickup lens driving apparatus according to claim 13, wherein an oscillation of said movable member can be performed in such a manner that said movable member is restricted movement thereof around said balance shaft by said bearing.

15. An optical pickup lens driving apparatus comprising:
an optical pickup lens;
a movable member mounting an optical pickup lens;
four supporting wires which movably support said movable member;

a fixing member in which said four supporting wires are supported;

a balance shaft in which one end of said balance shaft is connected to said movable member, a balance weight is provided at the other end, and a balancing middle portion of said balance shaft is oscillatably journaled in said fixing member; and

driving means which controls movement of said optical pickup lens through said balance shaft by action of electromagnetic force.

16. An optical pickup lens driving apparatus according to

claim 15, wherein said driving means includes a permanent magnet which is provided in said balance weight of said balance shaft and a driving coil which is provided in said fixing member while said driving coil is opposite to said permanent magnet.

17. An optical pickup lens driving apparatus according to claim 15, wherein said balance shaft is oscillatably journaled in said fixing member by a gimbal mechanism.

18. An optical pickup lens driving apparatus according to claim 15, wherein one side of said balance shaft is supported by said movable member via a bearing.

19. An optical pickup lens driving apparatus according to claim 18, wherein an oscillation of said movable member can be performed in such a manner that said movable member is restricted movement thereof around said balance shaft by said bearing.

20. An optical pickup lens driving apparatus comprising:
an optical pickup lens;

a plurality of driving control units which control movement of said optical pickup lens, said plurality of driving control units being arranged about said optical pickup lens at an equal angle; and

a balance shaft which is included in each of said plurality of driving control units, one end of said balance shaft being connected to a side of said optical pickup lens, a balance weight being provided at the other end of said balance shaft, and a

balancing middle portion of said balance shaft being oscillatably journaled in said fixing member.

21. An optical pickup lens driving apparatus according to claim 20, wherein one side of said balance shaft is supported by said side of the optical pickup lens via a bearing.

22. An optical pickup lens driving apparatus according to claim 21, wherein an oscillation said side of the optical pickup lens can be performed in such a manner that said side of the optical pickup lens is restricted movement thereof around said balance shaft by said bearing.